National Aeronautics and
Space Administration

Communications

Cellular Reflectarray Antenna (CRA)

A simple-to-install design for satellite and communications applications that solves the problems associated with traditional parabolic reflectors

NASAs Glenn Research Center invites companies to license a new concept design for terrestrial satellite dishes and communications systems. Glenns Cellular Reflectarray Antenna has been developed and tested for use with next-generation Ka-band satellites, although it can be used with all bands of satellite communication. The designs flat, planar configuration all but eliminates the wind-loading problems associated with larger parabolic reflectors for dish systems. The technology also offers unique features that provide ease of installation and improved signal reception while deterring piracy and theft of subscription satellite services.

BENEFITS

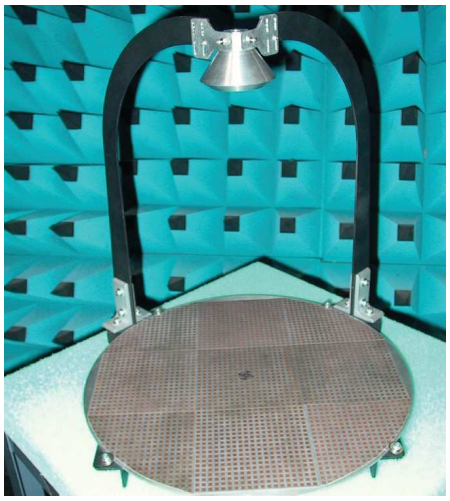
- Simple installation - untrained users (even consumers) will find the installation friendly, eliminating the cost of highly skilled technicians and most service calls
- Flat, compact design - the planar design helps avoid problems with wind catching that may impede signal reception, and it offers a more streamlined aesthetic and desirable look for residential satellite applications
- Improved signal - judicious choice of board material and dimensions as well as dual-frequency operation helps improve signal reception
- Security protection - 0peration only within a given geographic cell significantly deters piracy and efforts to steal signal from paid satellite subscribers

technology solution

THE TECHNOLOGY

The CRA is a unique design that promises to usurp conventional parabolic reflectors. The word cellular in the title of the design refers to a geographic cell of operation. Specifically, the CRA is designed to receive satellite signals for next-generation satellite television and communications services within a specified geographic area, or cell. Each cell comprises approximately 1,500 square miles. The CRA for any given cell operates by being aligned with its index pointing to magnetic north with the surface of the CRA level to the ground. The flat configuration of the CRA design makes this orientation streamlined and simple. The cellular nature of the CRA offers inherent security because it will not operate beyond its designated cell space, helping to deter piracy of subscription satellite services.

In the example of a subscription satellite television service, a CRA would be provided to a subscriber in a kit that also contains a simple compass for alignment purposes. The subscriber requires knowledge only of magnetic north from the operation location, which can easily be ascertained using the compass. Once positioned, a collimated antenna beam in the direction of a geostationary satellite is formed using a circular polarization method unique to Glenns design. In addition, the CRA aperture can operate at two distinct frequencies due to the choice of substrate thickness and materials, enabling both reception and transmission of signals. The materials used enable interlacing of high and low bands while maintaining only one main antenna beam for strong signal.



First generation CRA in RF test chamber

The NASA technology could be used in broadband satellite communications for residential and business entertainment applications.

APPLICATIONS

The technology has several potential applications:

- Broadband satellite communications residential and business entertainment and other broadband applications
- First-responder applications emergency communications for disaster response and recovery situations, including military
- Back-up communication for large events concerts, conventions and sporting events

PUBLICATIONS

Patent No: 7,791,552; 7,990,327

More Information

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